COLD WAVES AND FREEZING TEMPERATURES AT TAMPA, FLA.[1]

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Since April, 1890, when the Weather Bureau office was established in Tampa, there have been recorded only 51 dates when the temperature fell to 32° or below. Of these, 17 were dates immediately following other dates, so there were only 34 cold spells during which the freezing temperature was reached. A study of the weather conditions preceding and attending these occurrences was begun two years ago, at the Tampa office, and only recently completed.

The work involved copying the 8 a. m. weather maps for each date on which freezing temperature occurred, and also the maps for 24 and 48 hours preceding each. An additional study was made of the distribution of low temperatures over Florida on the same dates, by copying on a map of Florida the minima at all points from which data were obtainable, so that they might be compared with the temperature at Tampa.

The typical cold-wave map for this section shows a low-pressure area or storm center moving north-northeastward up the Atlantic coast, and a great area of high pressure moving southeastward over Nebraska, Kansas, Oklahoma, and Texas. This pressure distribution induces a flow of cold air from the northwest. The rapidity of the fall in temperature depends roughly on the intensity of the HIGH and the intensity of the LOW, and on the rate at which they are moving.

Different maps show wide variations from the typical one, but a few general rules have been found to hold approximately. These rules apply only to the first occurrence of freezing temperature at Tampa in a cold wave, and not to a second occurrence immediately following. Broad as these rules are exceptions can be found. Each exception is noted, and description given of actual conditions. In general the exceptions were when the temperature was already low at Tampa 24 hours preceding, or when the freezing temperature was just barely reached.

RULE I. The high-pressure area must be 30.40 inches or over, and the 30.40 isobar must reach as far south as Oklahoma, 24 hours preceding. (4 exceptions.)

Exception 1. January 6, 1893. Barometer above 30.30 inches over Arkansas, below 29.30 off New England. Temperature 47°F. at Tampa, 32° at Mobile, below 0°F. in Missouri. Tampa minimum next morning, 31°.

Exception 2. January 13, 1893. Barometer above 30.30 inches over Texas, below 29.30 over Nova Scotia. Temperature 45° at Tampa, 35° at Mobile, below 0°F. in Missouri. Tampa minimum next morning, 31°.

Exception 3. January 1, 1900. Barometer above 30.30 inches over Oklahoma, 30.60 over Montana, below 29.60 off New England. Temperature 52° at Tampa. Tampa minimum next morning 32°.

Exception 4. December 18, 1901. Barometer 30.36 inches at Mobile, below 30.00 off Hatteras. Temperature at Tampa 35°, at Mobile 20°, below 0°F. in Missouri. Tampa minimum next morning, 30°.

RULE II. The low-pressure area must be on the Atlantic coast and intensity 30.00 or below, 24 hours preceding. (4 exceptions.)

Exception 1. December 31, 1894. Barometer 30.10 inches on Georgia coast, 30.50 over Texas. Temperature 51° at Tampa, 31° at Mobile, 10° in Missouri. Tampa minimum next morning, 31°.

Exception 2. February 12, 1899. Barometer 30.02 inches at Tampa. Immense high pressure area with barometer 31.00 in central Texas. Temperature 62° at Tampa, 20° at Mobile, below 0° F. in Arkansas. Tampa minimum next morning, 28°.

Exception 3. December 20, 1901. Barometer at Key West 30.18 inches, in Texas 30.80. Temperature 49° at Tampa, 18° at Mobile, below 0°F. in Missouri. Tampa minimum next morning, 24°.

Exception 4. November 27, 1903. Barometer at Hatteras 30.04 inches, at Memphis 30.44. Temperature at Tampa 36°, at Mobile 28°. Tampa minimum next morning, 32°.

RULE III. The 32°F. isotherm must reach the Gulf coast 24 hours preceding. (5 exceptions.)

Exception 1. December 28, 1890. Temperature at Tampa 43°, at Mobile 34°. Barometer above 30.50 inches at Mobile, below 29.40 over Nova Scotia. Tampa minimum next morning, 31°.

Exception 2. January 13, 1893. Temperature at Tampa 45°, at Mobile 35°. Below 0°F. over Missouri. Barometer over Texas above 30.30, over Nova Scotia below 29.30. Tampa minimum next morning, 31°.

Exception 3. March 4, 1893. Temperature 72° at Tampa, 38° at Mobile, below 0°F. in Nebraska. Barometer above 30.70 in Oklahoma, below 29.30 at Hatteras. Tampa minimum next morning, 32°.

Exception 4. February 1, 1898. Temperature 44° at Tampa, 34° at Mobile, below 0°F. in Iowa. Barometer above 30.60 in Oklahoma, below 29.00 off New England coast. Tampa minimum next morning, 31°.

Exception 5. December 29, 1909. Temperature 48° at Tampa, 38° at Mobile, below 0°F. in Missouri. Barometer 30.40 at Oklahoma, 29.66 at Hatteras. Tampa minimum next morning, 27°.

RULE IV. The barometric gradient from Oklahoma, or center of HIGH east or south of Oklahoma; to Hatteras, or center of LOW south of Hatteras, 24 hours preceding, determines the fall in temperature at Tampa as follows:

Gradient of 0.90 inch or more means fall of 20 degrees or more.

Gradient of 0.60 or more means fall of 10 degrees or more.

Gradient of 0.40 or less means fall of less than 10 degrees.

The above rules were formulated before the recent freeze, and were verified by this freeze. The isobar of 30.40 inches passed through Alabama; the barometer at Hatteras was 29.78, temperatures were below 32° F. on the Gulf coast except the Florida Peninsula. The gradient was 1.00 inch from Texas to Hatteras, and the resulting fall in temperature was 18 degrees at Tampa, within 2 degrees of the fall called for by Rule IV.

[1] Weather maps illustrating conditions followed by frost or freezing temperatures in Florida are published in the handbook "Weather Forecasting the United States" (W. B. No. 583), Washington, 1916. See there, figures 111 to 116, inclusive, accompanying the text of pp. 190–191; also text on p. 180.

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